Recent Generalization Development and Road Ahead

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- Geoprocessing in ArcGIS
- Recent generalization development
- Road ahead
Geoprocessing in ArcGIS

ArcGIS - the new generation of ESRI software

- A single, unified, scalable, object-oriented GIS software with COM-based components, and geodatabase data model
- Unifies the traditional ArcView and ArcInfo environments
  - common architecture
  - same underlying executables and user interface
  - common extension models
Core components:

**ArcMap**
- Data compilation, editing
- Advanced symbology, map layout and composition, automated text placement
- Many export, printing options and formats

- Start to finish map making software
ArcCatalog

- Create and access geodatabases, datasets, feature classes, tables, subtypes, domains, relationships
- Quick preview and display of the contents
- Read and create metadata

- Geodatabase creation and management software
Geoprocessing – the framework for core GIS operations

- Data format conversion
- Data manipulation
  - Add, Delete, Append, Split, ...
- Spatial analysis
  - Union, Intersect, Buffer, ...
  - Statistics ...
- Process modeling

Data + tool --> Derived Data
To perform geoprocessing tasks

- Dialog

- Geoprocessing window and command line
To perform geoprocessing tasks

- Script

- Model
Recent Generalization Development

- the integration of generalization into ArcGIS …

**Ultimate goal:**
To support database generalization and cartographic generalization in a flexible and user-controlled environment with maximum automation and productivity

**Newly available:**
Topology engine
TIN engine, enhanced to support generalization
The beginning phase

Re-evaluate existing generalization tools and techniques

- Line simplification
- Building simplification
- Conflict detection
- Street centerline
- Area aggregation
Port coverage generalization tools

- Create Centerlines
  - Input coverage
  - Output coverage
  - Maximum width
  - Minimum width (optional)

- Simplify Buildings
  - Input coverage
  - Output coverage
  - Simplification tolerance
  - Minimum area (optional)
  - Input selection file (optional)
  - Check for spatial conflicts (optional)
Create generalization functions in ArcObjects library

ArcObjects - the collection of COM-based ArcGIS components

- The development platform for ArcGIS Desktop applications
- The open programming environment makes the full capability of ArcGIS accessible to all
Build Geodatabase feature generalization tools
Focus on generalization quality and data integrity

- Improve line simplification quality
  - Localize and resolve topological errors
  - Handle shared geometry
- Carry relationships in the generalized data to the source data
  - One-to-one relation via Oids
  - One-to-many relation tables
- Provide ways to keep track of “lost” data
  - Zero-length lines as result of simplification
- Flag problems and generalization status
  - Less generalized features (line simplification)
  - Unresolved cases (line smoothing)
Road ahead

- Extend the ArcObjects library
- Add a full set of generalization tools
- Integrate generalization capability in the editing and map compilation environments
- Build towards a rule-driven, intelligent generalization engine
- Create smart features and enrich databases
- Meet the requirements for on-demand generalization and location-based mapping
Working on new algorithms …

- Dual-line-to-centerline Collapse
- Area-Aggregation
Deriving generalization models ...
Other ongoing research and investigations ...

- **Database cartography**
  - Evolving towards data driven “smart maps”
  - Using the database to automate decision-making and processes for making maps

- **Cartographic features and multiple scale representations**
  - Multiple geometry linked to single source data
  - Drawing rules (symbology, placement, scale …)

- **Updating generalized maps**